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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/010,280	12/05/2001	Robert B. Ogle	M-7522 US	5067

7590                    11/29/2002

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[REDACTED] EXAMINER

PIZARRO CRESPO, MARCOS D

[REDACTED] ART UNIT

[REDACTED] PAPER NUMBER

2814

DATE MAILED: 11/29/2002

9

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/010,280	OGLE ET AL.
	Examiner Marcos D. Pizarro-Crespo	Art Unit 2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 25 October 2002.

2a) This action is FINAL.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-27 is/are pending in the application.

4a) Of the above claim(s) 17-21 is/are withdrawn from consideration.

5) Claim(s) 22-27 is/are allowed.

6) Claim(s) 1,10,15,16 is/are rejected.

7) Claim(s) 2-9 and 11-14 is/are objected to.

8) Claim(s) 1-27 are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____	6) <input type="checkbox"/> Other: _____

Attorney's Docket Number: M-7522 US

Filing Date: 12/5/2001

Claimed Foreign Priority Date: 12/6/2000 (Provisional 60/254,066)

Applicant(s): Ogle et al.

Examiner: Marcos D. Pizarro-Crespo

## **DETAILED ACTION**

This Office action responds to the amendment in paper no. 8 filed on 10/25/2002.

### ***Acknowledgment***

1. The amendment in paper no. 8 filed on 10/25/2002 in response to the Office action (paper no. 7) mailed on 8/26/2002 has been entered. The present Office action (paper no. 9) is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 1-27.

### ***Specification***

2. The title of the invention is not descriptive. The title amended in paper no. 8 recites "Oxidizing pretreatment of an NON layer..." whereas the claims are directed to an oxidizing pretreatment for an ONO layer. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Claim Objections***

3. Claims 2, 6, and 11-14 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 22-27, respectively. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a

slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 10, 15, and 16, are rejected under 35 U.S.C. 103(a) as being unpatentable over Hong (US 5445984) in view of Eitan (US 5966603).

7. Regarding claim 1, Hong shows (see, e.g., fig. 2) most aspects of the instant invention including a method of forming a dielectric structure for a flash memory cell, the method comprising:

- forming a first layer of silicon dioxide overlying a gate electrode **24** of the flash memory cell (col.6/ll.40-43)

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- forming a silicon nitride layer on the first layer of silicon dioxide (col.6/II.44-46)
- oxidizing the silicon nitride layer (col.6/II.47)

Hong also teaches that by oxidizing the silicon nitride layer a second layer of silicon dioxide is formed (col.6/II.46). Alternatively, this second layer of silicon dioxide may be formed by deposition (col.6/II.47-49). By doing this, Hong completed his formation of an intergate dielectric layer (ONO) 38. However, Hong fails to teach that deposition of the second silicon oxide layer is accomplished after oxidizing the silicon nitride layer.

As Hong, Eitan describes a method to form ONO layers and teaches that the top oxide layer within an ONO layer may either be formed through an oxidation of the nitride layer or by deposition (col.3/II.51-53). Eitan further teaches that forming the top oxide layer by a combination of the nitride oxidation and an oxide deposition is *an alternative operation* to either the nitride oxidation or the oxide deposition (col.3/II.53). Ultimately, the process by which the top oxide layer is generated will depend on the ability of the manufacturing facility to control the thickness and composition of the layers of the ONO structure (Eitan/col.4/II.8-11).

Consequently, it would have been obvious at the time of the invention to one of ordinary skill in the art to oxidize Hong's nitride layer and subsequently deposit a second oxide layer on the oxidized nitride layer, as taught by Eitan, since this is *an alternative operation step* to either of Hong's nitride oxidation and oxide deposition steps.

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8. Regarding claim 10, Hong shows (see, e.g., fig. 2) most aspects of the instant invention including a method of making a flash memory cell including a first polysilicon layer 24, the method comprising:

- forming a first layer of silicon dioxide on the first polysilicon layer (col.6/ll.40-43)
- forming a silicon nitride layer on the first layer of silicon dioxide (col.6/ll.44-46)
- oxidizing the silicon nitride layer (col.6/ll.47)

Hong also teaches that by oxidizing the silicon nitride layer a second layer of silicon dioxide is formed (col.6/ll.46). Alternatively, this second layer of silicon dioxide may be formed by deposition (col.6/ll.47-49). By doing this, Hong completed his formation of an intergate dielectric layer (ONO) 38. However, Hong fails to teach that deposition of the second silicon oxide layer is accomplished after oxidizing the silicon nitride layer.

As Hong, Eitan describes a method to form ONO layers and teaches that the top oxide layer within an ONO layer may either be formed through an oxidation of the nitride layer or by deposition (col.3/ll.51-53). Eitan further teaches that forming the top oxide layer by a combination of the nitride oxidation and an oxide deposition is *an alternative operation* step to either the nitride oxidation or the oxide deposition (col.3/ll.53). Ultimately, the process by which the top oxide layer is generated will depend on the ability of the manufacturing facility to control the thickness and composition of the layers of the ONO structure (Eitan/col.4/ll.8-11).

Consequently, it would have been obvious at the time of the invention to one of ordinary skill in the art to oxidize Hong's nitride layer and subsequently deposit a second oxide layer on the oxidized nitride layer, as taught by Eitan, since this is an *alternative operation* step to either of Hong's nitride oxidation and oxide deposition steps.

9. Regarding claim 15, Eitan shows the first silicon oxide layer may be 50 Å-thick (col.3/II.45), the nitride layer may be 50 Å-thick (col.3/II.57), and the second silicon oxide layer may be 50 Å-thick (col.3/II.61).

10. Regarding claim 16, Hong shows (see, e.g., fig. 2) a second polysilicon layer **28** on the second silicon oxide layer.

#### ***Allowable Subject Matter***

11. Claims 22-27 are allowed.

12. Claims 3-5 and 7-9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Response to Arguments***

13. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

14. The applicants argue:

The combination of Hong and Eitan does not have adequate motivation. Specifically, the ONO stack of Hong is the dielectric between the control gate and the floating gate. The ONO structure of Eitan, on the other hand, is underneath the gate electrode. There is no disclosure in Eitan of forming the gate structure overlying the ONO stack as recited in claim 10.

The examiner responds:

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The features upon which the applicant relies (i.e., forming a gate structure overlying the ONO stack) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

15. The applicants argue:

The motivation suggested by the examiner to combine Hong and Eitan is merely that it is possible to oxidize the nitride layer in an ONO stack, as taught by Eitan. There is no indication of why would one oxidize Hong nitride layer. The examiner does not indicate any particular properties suggested by Eitan that would result as a consequence of oxidizing Hong's nitride layer. Neither the examiner indicates why such a step would provide better performance or yield.

The examiner responds:

Contrary to applicants' assertion, the motivation suggested by the examiner to combine Eitan and Hong is not to teach that it is possible to oxidize nitride in an ONO stack, since this step is clearly shown by Hong. See, for example, Hong/col.6/ll.47-49, where Hong clearly teaches that the nitride layer may be oxidized.

Moreover, Hong also teaches that by oxidizing the silicon nitride layer a second layer of silicon dioxide is formed (col.6/ll.46). Alternatively, this second layer of silicon dioxide may be formed by deposition (col.6/ll.47-49). Hong, however, fails to teach that deposition of the second silicon oxide layer is accomplished after oxidizing the silicon nitride layer.

Eitan, on the other hand, describes a method to form ONO layers and teaches that the top oxide layer within an ONO layer may either be formed through the oxidation of a nitride layer or by deposition (col.3/ll.51-53). Eitan further teaches that forming the top oxide layer by a combination of the nitride oxidation and an oxide deposition is an

*alternative operation* step to either the nitride oxidation or the oxide deposition (col.3/II.53). Ultimately, the process by which the top oxide layer is generated will depend on the ability of the manufacturing facility to control the thickness and composition of the layers of the ONO structure (Eitan/col.4/II.8-11).

In summary, according to Eitan it would have been within the capabilities of one of ordinary skill in the art to oxidize Hong's nitride layer and subsequently deposit a second oxide layer on the oxidized nitride layer since this is *an alternative operation* step to either of Hong's nitride oxidation and oxide deposition steps.

### ***Conclusion***

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

17. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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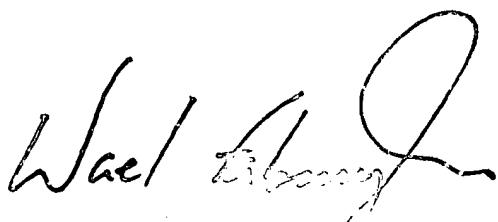
18. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722 or -7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Marcos D. Pizarro-Crespo** at **(703) 308-6558** and between the hours of 9:00 AM to 7:30 PM (Eastern Standard Time) Monday through Thursday or by e-mail via [Marcos.Pizarro@uspto.gov](mailto:Marcos.Pizarro@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (703) 308-4918.

20. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

21. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/324; 438/216,261,287	11/18/2002
Other Documentation: PLUS Analysis	8/16/2002
Electronic Database(s): EAST (USPAT, EPO, JPO)	11/18/2002



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